

CLAIMS

1 1. In an aircraft powered by a gas turbine engine containing
2 an igniter which is fed by a power cable which is surrounded by a
3 conductive shield connected to a system ground, a method
4 comprising:

- 5 a) detecting current pulses in the shield; and
6 b) in response to detected current pulses, issuing to
7 a pilot station in the aircraft a signal indicating
8 presence of spark in the igniter.

1 2. In an aircraft powered by a gas turbine engine containing
2 an igniter which is fed by a power cable, said igniter and power
3 cable being surrounded by conductive shielding, a method
4 comprising:

- 5 a) maintaining a coil outside the shielding;
6 b) detecting current pulses in the coil; and
7 c) in response to detected current pulses, issuing to
8 a pilot station in the aircraft a signal indicating
9 presence of spark in the igniter.

1 3. Method according to claim 2, wherein no components
2 involved in detecting the current pulses penetrate the conductive
3 shielding.

1 4. Method according to claim 2, wherein the current pulses
2 have a duration D and a frequency F, and wherein detecting the

3 current pulses comprises:

4 i) maintaining a series RLC circuit, comprising inductor
5 L, resistor R, and capacitor C, wherein

6 A) the inductor L comprises the coil, and

7 B) the RLC circuit amplifies signals induced
8 by the pulses.

1 5. Method according to claim 2, wherein (1) the current
2 pulses generate voltage pulses in the coil, (2) the coil has an
3 inductance L, and (3) detecting the current pulses comprises:

4 i) connecting the coil to a circuit containing a
5 resistance R and a capacitance C; and

6 ii) using a value of capacitance C which causes
7 amplification of the voltage pulses.

1 6. Method according to claim 5, wherein the amplification of
2 the voltage pulses causes a voltage signal to appear across the
3 capacitance C which is greater than voltage appearing across the
4 coil in the absence of the circuit.

1 7. In an aircraft powered by a gas turbine engine containing
2 an igniter which is fed by a power cable which is surrounded by a
3 conductive shield connected to a system ground, a apparatus
4 comprising:

5 a) a detector for detecting current pulses in the
6 shield; and

7 b) an annunciator for issuing a signal indicating
8 presence of spark in the igniter to a pilot station in
9 the aircraft.

1 8. Apparatus according to claim 7, wherein the signal is
2 issued based on the current pulses.

1 9. In an aircraft powered by a gas turbine engine containing
2 an igniter which is fed by a power cable, said igniter and power
3 cable being surrounded by conductive shielding, apparatus
4 comprising:

5 a) a coil outside the shielding;

6 b) a detector for detecting current pulses in the coil;

7 and

8 c) an annunciator for issuing a signal indicating
9 presence of spark in the igniter to a pilot station in
10 the aircraft, in response to detected current pulses.

1 10. Apparatus according to claim 9, wherein no components
2 involved in detecting the current pulses penetrates the conductive
3 shielding.

1 11. Apparatus according to claim 9, wherein the current
2 pulses have a duration D and a frequency F , and further comprising:

3 i) a series RLC circuit, comprising inductor L , resistor
4 R , and capacitor C , wherein

- 5 A) the inductor L comprises the coil, and
6 B) the RLC circuit is resonant at a steady-
7 state sinusoidal frequency $F(\text{res})$, wherein
8 $F(\text{res})$ lies within the range $(0.8)(1/D)$ to
 $(1.2)(1/D)$.

1 12. Apparatus according to claim 9, wherein (1) the current
2 pulses generate voltage pulses in the coil, (2) the coil has an
3 inductance L, and further comprising:

- 4 i) a connection between the coil and a circuit
5 containing a resistance R and a capacitance C, wherein
6 the value of capacitance C which causes amplification of
7 the voltage pulses.

1 13. Apparatus according to claim 12, wherein the
2 amplification of the voltage pulses causes a voltage signal to
3 appear across the capacitance C which is greater than voltage
4 appearing across the coil in the absence of the circuit.

1 14. Method of starting a gas turbine engine, comprising:

- 2 a) causing the engine to rotate;
3 b) delivering fuel to a combustor in the engine;
4 c) actuating an igniter to ignite the fuel; and
5 d) if ignition fails to occur,
6 i) examining an indicator which produces a
7 signal when the igniter produces spark and

8 ii) if no signal is detected, taking a
9 predetermined action A.

1 15. Method according to claim 14, wherein the predetermined
2 action A comprises requesting diagnosis of an ignition system in
3 the engine.

1 16. Method according to claim 14, and further comprising:
2 iii) if a spark signal is detected after
3 ignition fails to occur, taking a
4 predetermined action B.

1 17. Method according to claim 16, wherein the predetermined
2 action B does not include examining an igniter, or replacing an
3 igniter.

1 18. Method according to claim 14, wherein the engine is
2 located in an aircraft, and the indicator is located at a pilot
3 station in the aircraft.

1 19. A method of operating a gas turbine engine which powers
2 an aircraft, comprising:

3 a) maintaining an igniter which is
4 i) surrounded by a housing, and
5 ii) fed by a power cable which is surrounded
6 by a conductive shield which is connected to

7 the housing; and
8 b) detecting current in the shield, housing, power
9 cable, or a combination thereof, but without electrically
10 contacting the power cable, and, in response to detected
11 current, actuating an annunciator at a pilot station in
12 the aircraft, informing the pilot of the detected spark.

1 20. Method according to claim 19, wherein the process of
2 detecting current comprises:

3 c) maintaining a coil adjacent the shield;
4 d) inducing currents in the coil by currents in the
5 shield;
6 e) detecting induced currents in the coil; and
7 f) issuing the signal in response to detection of the
8 induced current.